

BENEATH THE SURFACE

Geoscy LLC provides state-of-the-art 2- and 3-D images, maps, and assessments of subsurface infrastructure, including utilities, and substrate conditions to aid construction and reduce costs

by Robyn M. Feller

Identification, location and diagnosis of underground infrastructure, geology, and natural hazards are major problems in subsurface construction. Inadvertent damage to existing facilities during construction can impact project costs, schedule, and safety. Image surveys, based on geophysical methods, are an efficient and affordable way to help visualize and understand subsurface conditions, especially previously unknown structures and hazards, before they become problems. This permits construction professionals to anticipate subsurface obstructions, avoid utility damage, reduce excavation and drilling, and lower project costs, among many other benefits. This specialized service takes true expertise. That's where Geoscy LLC and its Founder and Owner, Dr. Michael Prentice, come in.

Geoscy LLC is a geological-geophysical services company that provides geophysical surveys of subsurface infrastructure, including utilities, foundation conditions, and subsurface hazards. For hazards, Geoscy focuses on ground cavities and subsidence, wetlands, embankment slumping and landslides, and, in limestone terrain, sinkholes. The information provided by a Geoscy state-of-the-art geophysical survey can greatly reduce the amount of test-pit/coring in preconstruction investigations and problems encountered during subsurface construction while it increases spatial coverage of a construction site.

Geoscy at Its Core

Dr. Michael Prentice, who founded Geoscy LLC in 2013, shares, "I launched Geoscy in order to bring recent innovations in shallow geophysics to the building and construction fields where the techniques are underutilized. Because I had worked for Indiana University Bloomington at the time, Geoscy started in my basement in southern Indiana." A few years later, Mike, a New Englander at heart, moved Geoscy to a 2,600-sq-ft facility near the Connecticut River



Complex subsurface infrastructure can be discovered using data and images collected from surface using geophysical methods.

Geoscy focuses on mapping and diagnosing:

- **Utilities** - water mains, electrical cabling, pipes with stormwater, drinking water, wastewater, and natural gas.
- **Infrastructure** - storage tanks, trench shields, retaining walls, old foundations, old transportation materials.
- **Foundation Conditions** - rock and sediment types, depth to competent materials, voids, wetlands.
- **Slope Stability** - likely failure zones, zones of excess water content, estimation of rock/soil shear strength.
- **Ground Subsidence** - distribution of wet and organic soils, weathered and fractured rock zones, groundwater flow patterns.
- **Sinkholes** - width, depth, collapse history, collapse mechanisms.

in Massachusetts. Mike holds a PhD in Geological Sciences and is a Licensed Professional Geologist. He draws on 40 years of experience digging and coring through subsurface materials the world over, perfecting collection and interpretation of geophysical data in terms of subsurface conditions. He adds, "We've worked nationally and internationally in places as remote as Antarctica and New Guinea."

Geoscy EML, GPR and ERI Services

Geoscy LLC specializes in several methods for mapping subsurface features, including electromagnetic induction locating (EML), ground-penetrating radar (GPR), and electrical resistivity imaging (ERI). Mike explains, "EML is fast and targets specific utilities but is limited to metallic cables and pipes. GPR is a less rapid but more accurate and comprehensive method for mapping all subsurface features. ERI measures variations in the electrical resistivity of the subsurface, which coincide with fine-scale variations in subsurface materials and fluids. Resistivity images reveal these variations. Geoscy uses high-precision Global Positioning System (GPS) techniques to track its geophysical surveys and a range of other methods to provide maps of underground features."

How Geoscy Operates

Geoscy offers a specialized service. Mike says, "Geoscy provides EML, GPR, and ERI surveys. We can also collect and analyze site materials to fine-tune survey interpretations. Adding GPS enables us to analyze results in ArcGIS in the context of publicly available imagery, LiDAR, etc. and provide survey-quality maps. EML and GPR surveys are accomplished at walking speed—miles of data can be collected in a day. ERI surveys are fixed on the ground, involve more equipment and take longer but they image deeper and have the advantage that repeat surveys, to measure changes in subsurface water content, for example, require no set-up. It is very cool that these techniques are so complementary."

Geoscy works with a network of experts in New England and the Midwest, who along with Mike, collect the field data. This unique knowledge base gives Geoscy a significant advantage. Mike remarks, "While our geographic coverage is primarily New England, New York, Indiana and neighboring states, we will work throughout the U.S. and internationally."

Deliverables will depend on the nature of the project but can include a report with projected maps and subsurface cross-sections that show original data and interpretations



Geoscy LLC has a variety of ways to deploy various GPR antennas and GPS gear.



Geoscy LLC can handle large jobs with its extensive electrical resistivity imaging (ERI) equipment.

for utilities, infrastructure, substrates, and/or other conditions. Initial consultations are extremely important and site visits are highly recommended. Data processing and report preparation are accomplished at Geoscy HQ, but preliminary results can be produced remotely.

Geoscy Advantages

Subsurface imaging with geophysical techniques provides a tremendous amount of information without site disturbance, rapidly, and at minimal cost. The techniques have not been widely adopted because the expertise and experience necessary to quickly collect good data and provide expert interpretations are hard won. Geoscy is expert in these fields and its geologic roots bring additional value.

Mike concludes, "Geoscy surveys help construction professionals improve bid and scheduling accuracy, avoid costly mistakes and, above all else, solve subsurface problems. Surveys can indicate where natural hazards are likely and facilitate better engineering solutions. Time and again, Geoscy surveys result in potential project cost savings that far exceed the cost of the survey itself."



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